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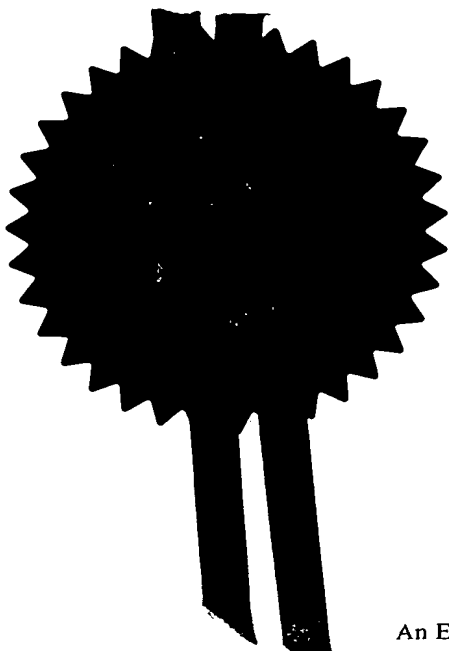
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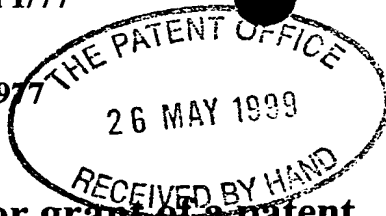
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1. Your Ref/

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2. Patent application number

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26 MAY 1999

3. Full name, address and postcode of the or of each applicant (underline all surnames)

C-Dilla Limited

Woodley House
Crockhamwell Road
Woodley
Reading
Berkshire RG5 3JP

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

THE COPY PROTECTION OF DIGITAL AUDIO
COMPACT DISCS

5. Name of your agent (if you have one)

W.H. BECK, GREENER & CO.

"Address for service" in the United Kingdom to which all correspondence should be sent (including postcode)

W.H. BECK, GREENER & CO.
7 STONE BUILDINGS
LINCOLN'S INN
LONDON
WC2A 3SZ

Patents ADP number (if you know it)

323001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application
number
(if you know it)

Date of filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
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Description 5

Claim(s)

Abstract

Drawing(s) 2

228

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Request for preliminary examination and search (*Patents Form 9/77*)

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11. I/We request the grant of a patent on the basis of this application.

Signature *W H Beck Greeney & Co* Date 26/05/99

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THE COPY PROTECTION OF DIGITAL AUDIO COMPACT DISCS

The present invention relates to a method of copy protecting a digital audio compact disc, and to a copy protected digital audio compact disc.

5

Digital audio compact discs (CD-DA) which carry music or other audio can be played or read by more sophisticated CD-ROM players. This means, for example, that the data on a CD-DA acquired by a user may be read into a PC by way of its ROM drive and thus copied onto another disc or other recording medium. The increasing availability of recorders able to write to CDs is therefore an enormous threat to the music industry.

10

The present invention seeks to provide a method of copy protecting a digital audio compact disc.

15

According to a first aspect of the present invention there is provided a method of copy protecting a digital audio compact disc, wherein control data usable by a CD-ROM player is encoded on the compact disc, the copy protection method comprising the step of rendering selected control data incorrect and/or inaccurate.

20

With an embodiment of the invention, the incorrect data encoded onto the CD is either inaccessible to, or not generally read by, a CD-DA player. Therefore, a legitimate audio CD bought by a user can be played normally on a compact disc music player. However, the incorrect data renders the CD unplayable by a CD-ROM player. This prevents copying of the data on the compact disc.

25

Of course, by rendering the audio compact disc unplayable on a CD-ROM drive, the user is also prevented from using the CD-ROM drive legitimately simply to play the music or other audio on the disc.

30

The data encoded on the compact disc which has been rendered incorrect is preferably navigation data for a CD-ROM drive.

35

In a particularly preferred embodiment, the time to Lead-Out data is set at zero in the Lead-In frame of the compact disc.

5 Additionally and/or alternatively, data encoded on the compact disc defining the nature of the tracks is rendered incorrect.

In a preferred embodiment, the data on the CD identifying the nature of the tracks incorrectly identifies each audio track as a data track.

10 Preferably, the control data encoded on the compact disc is altered prior to mastering of the disc.

The present invention also extends to a copy protected digital audio compact disc, wherein control data usable by a CD-ROM player is encoded on
15 the compact disc, and wherein selected control data has been rendered incorrect and/or inaccurate.

Embodiments of the present invention will hereinafter be described, by way of example, with reference to the accompanying drawings, wherein:

20 Figure 1 shows schematically a compact disc showing the spiral data track,

Figure 2a shows an example of the track definition within the Table of Contents of a CD-DA, and

25 Figure 2b shows the Table of Contents of the CD-DA of Figure 2a when the disc has been copy protected.

A digital audio compact disc (CD-DA), which carries music and is to be played on a conventional CD disc player, is made and recorded to a standard
30 format known as the *Red Book* standards. As well as defining physical properties of the disc, such as its dimensions, and its optical properties, such as the laser wavelength, the *Red Book* also defines the signal format and the data encoding to be used.

As is well known, the use of the *Red Book* standards ensure that any CD-DA produced to those standards will play on any disc player produced to those standards.

5 Figure 1 shows schematically the spiral track 4 on a CD 6. This spiral track 4 on a CD-DA is divided into a Lead-In 8, a number of successive music or audio tracks as 10, and a Lead-Out 12. The Lead-In track 8 includes a Table of Contents (TOC) which identifies for the player the tracks to follow, whilst the Lead-Out 12 gives notice that the track 4 is to end.

10 An audio disc player always accesses the Lead-In track 8 on start up. The music tracks may then be played consecutively as the read head follows the track 4 from Lead-In to Lead-Out. Alternatively, the player navigates the read head to the beginning of each audio track as required.

15 All compact disc players are programmed not to move the read head beyond the start of the Lead-Out track 12. This is to protect the read head.

20 To the naked eye, a CD-ROM looks exactly the same as a CD-DA and has the same spiral track divided into sectors. However, CD-ROM players are much more sophisticated and are able to read data, and process information, from each track sector of the compact disc according to the nature of that data or information. A CD-ROM player can navigate by reading information from each frame whereby the read head can be driven to access any appropriate part
25 of the spiral track 4 as required.

30 To ensure that any CD-ROM player can read any CD-ROM, the compact discs and players are also made to standards known, in this case, as the *Yellow Book* standards. These *Yellow Book* standards incorporate, but extend, the *Red Book* standards. Hence, a CD-ROM player can play a CD-DA.

35 The ability of a CD-ROM player to access the data on a CD-DA provides a problem for the music industry. A user can use his CD-ROM player to read the data from an audio disc, for example, into a computer file, and then that data can be copied. The increasing availability of recorders able to record onto compact discs means that individuals and organisations now have easy access

to technology for making perfect copies of audio compact discs. This is of great concern to the music industry.

It will be apparent from the above that an audio disc player only looks for and uses data encoded according to *Red Book* standards, whilst a CD-ROM player requires further data, the further data being encoded according to the *Yellow Book* standards. The present invention therefore suggests that audio discs should be encoded with selected *Yellow Book* data, but that this data should be incorrect whereby a CD-ROM player is either confused or unable to read the audio disc. This system of the invention has the disadvantage that a user cannot play a legitimately acquired audio disc having the copy protection on a CD-ROM player in a legitimate manner, that is, simply to play the music recorded on the disc. However, in view of the potential losses from piracy, the music industry are willing to accept that disadvantage.

As the data encoding on a CD-DA and on a CD-ROM is well known and in accordance with the appropriate standards, it is not necessary to describe it further herein.

As is well known, the Lead-In to a CD-DA includes a TOC. Part of a typical TOC is set out in table form in Figure 2a. It will be seen therefrom that each track, at 14, is given, at 16, a start address in time and in frames from the Lead-In. Each track is also given a logical block address (LBA) 18 which gives the address of the start of the track on the disc. The TOC of an audio disc also identifies the time from the start of the disc to the start of the Lead-Out as indicated at 20. However, the applicants have determined that an audio disc player does not read or use the Lead-Out time from the TOC.

Figure 2b shows in table form part of the TOC from Figure 2a after it has been altered to copy protect the disc. Specifically, it will be seen that, at 20, the time from the start of the disc to Lead-Out has been set to zero indicating that the Lead-Out is at the commencement of the CD track. A CD-ROM player, therefore, accessing the disc 6 will read from the Lead-In information signifying that it is at the start of the Lead-Out. The CD-ROM player will refuse to move the read head beyond the start of the track because it believes it is at the start of

the Lead-Out. A CD-ROM player, therefore, will be unable to read or play the disc with the TOC of Figure 2b.

5 The TOC of Figure 2b has been altered in a second way which also prevents proper use by a CD-ROM player of the information on the disc. In this respect, and as is apparent from Figures 2a and 2b, the tracks on the audio disc are all audio tracks as noted at 22. In the TOC of Figure 2b these tracks have been erroneously identified as data tracks. Thus, even if the CD-ROM player is manipulated to ignore the false Lead-Out information in the TOC, it is told that
10 each of the following tracks contains digital data, rather than analog audio. Any reading of those tracks is therefore confused as the player tries to read the data but cannot find the appropriate SYNC or sector headers. Errors therefore result and the reading is unsatisfactory.

15 The embodiments described and illustrated above identify two alterations that can be made to the data in the Lead-In to an audio disc to copy protect that disc. It will be appreciated that any data which is transparent to the audio player may be altered to confuse, or prevent the operation of, a CD-ROM player. Additionally and/or alternatively, data may be provided on an audio disc to
20 prevent the generation of a digital output from the audio player. It will also be appreciated that alternative or additional errors in *Yellow Book* standard data can be introduced as required.

25 Further modifications in or variations to the embodiments described above may be made within the scope of this application.

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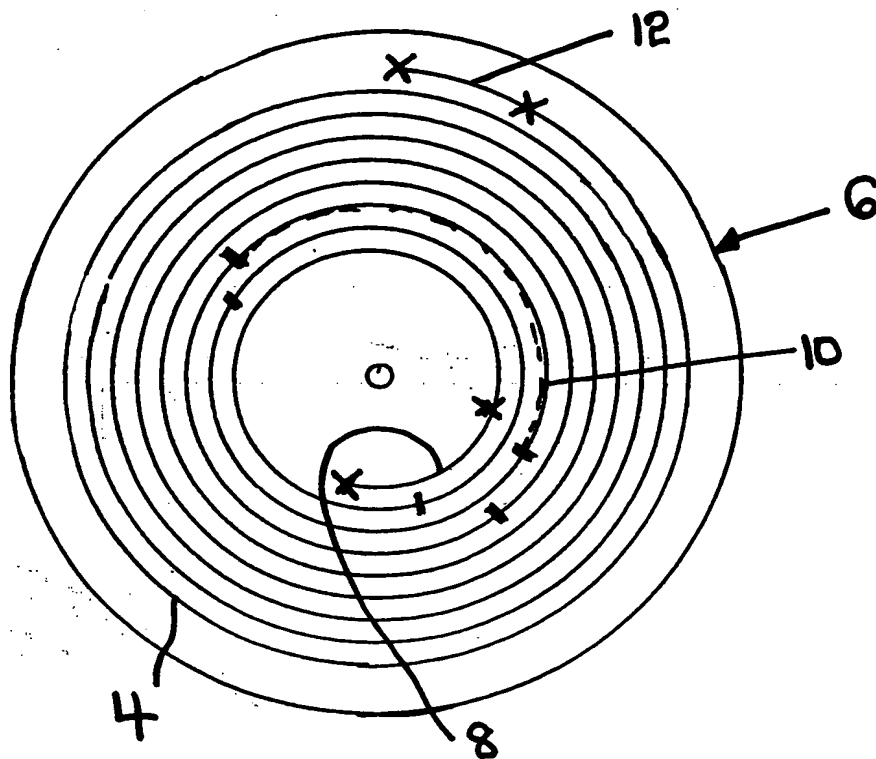


Figure 1

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14 22 16 ~ 18

↓ ↘ ↓

Trk	Type	Min:Sec:Frm	LBA
01	Audio	00:02:00	000000
02	Audio	03:27:27	015402
03	Audio	07:26:57	033357
04	Audio	11:00:57	049407
05	Audio	14:52:49	066799

Leadout: 18:00:57 (LBA 82218) ← 20

Figure 2a

22

↓

Trk	Type	Min:Sec:Frm	LBA
01	Data	00:02:00	000000
02	Data	03:27:27	015402
03	Data	07:26:57	033357
04	Data	11:00:57	049407
05	Data	14:52:49	066799

Leadout: 00:00:00 (LBA 4294967146) ← 20

Figure 2b

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